

## GUIDELINES FOR SAFE USE OF FORMALDEHYDE

### SafetyNet #11

Formaldehyde is a colorless, flammable gas with a strong pungent odor that can be detected at less than 0.5 parts per million (ppm). Its chemical formula is  $\text{H}_2\text{CO}$ . Although it is a gas at room temperature, formaldehyde is readily soluble in water, ethanol, or acetone. It is most commonly sold as a 37% aqueous solution with trade names such as formalin or formol. In water, formaldehyde converts to the hydrate  $\text{C H}_2(\text{OH})_2$ . Thus, solutions (such as formalin) contain relatively little  $\text{H}_2\text{CO}$ . Common uses of formalin and formaldehyde include tissue fixing and preservation, disinfection and fumigation. Formaldehyde is also used as a detergent in RNA gel electrophoresis, unlabeled RNA in order to form secondary structures.

Material hazards include toxicity, reactivity and flammability. The flash point for formaldehyde is  $-53^\circ\text{C}$ , although the 37% formalin solution (methanol free) flash point is  $83^\circ\text{C}$ . Formaldehyde reacts with acids, alkali metals, and strong oxidants. Exposure to formaldehyde vapors can be irritating to the eyes, nose, and upper respiratory tract. In certain individuals, repeated skin exposure to the liquid can cause sensitization that may result in allergic dermatitis. Formaldehyde is a suspected human carcinogen.

Cal/OSHA has identified formaldehyde as a carcinogen and has adopted an airborne formaldehyde permissible exposure limit (PEL) of 0.75 ppm averaged over an 8-hour work shift. The agency has also established a short-term exposure limit (STEL) of 2 ppm over a 15-minute period. The American Conference of Governmental Industrial Hygienists (ACGIH) has established a more restrictive Threshold Limit Value-Ceiling (TLV-C) for formaldehyde of 0.3 ppm based on its sensory irritation properties.

If you use or store any form of formaldehyde (e.g. formalin, paraformaldehyde) you must obtain a Carcinogen Use Authorization. The application form can be downloaded from the EH&S website at: [http://ehs.ucdavis.edu/ftpd/carcingn/carc\\_e\\_2.pdf](http://ehs.ucdavis.edu/ftpd/carcingn/carc_e_2.pdf).

### Minimizing Exposure To Formaldehyde For Health Protection

- **All** work with any forms of formaldehyde should be performed in a chemical fume hood. If work cannot be done in a hood, contact EH&S to take air measurements assuring that exposures are below Cal/OSHA's 0.5 ppm action level and 2 ppm STEL. As appropriate, EH&S will make additional recommendations based on sampling results.
- **Wear protective clothing.** Gloves must be worn whenever any forms of formaldehyde, or samples preserved with and/or fixed with formalin, are handled. Wearing two layers of gloves is advised. Safety goggles or a face shield must be worn whenever work activities create a potential for splashing.

### Special Safety Precautions

- If formalin or other forms of formaldehyde contact the body, especially the eyes, flush the affected area with water for at least 15 minutes and report to Employee Health Services.
- Wearing contact lenses is not recommended in areas of formaldehyde use. Hydrophilic gases, such as ammonia, formaldehyde, and hydrogen chloride may cause more harm to contact lens wearers than non-wearers in areas where these gases reach hazardous concentrations.

- **All** solutions of formalin and tissues preserved in formalin must be stored in tightly sealed containers to prevent leaks, spills, and airborne exposure.
- Do not allow this chemical to enter the environment. The substance is very toxic to aquatic organisms.
- Do not pour formalin waste down the drain. Formalin and other formaldehyde waste solutions must be placed in tightly sealed, labeled waste containers. All formaldehyde wastes must be managed and disposed as hazardous waste. See SafetyNet #8, "Guidelines for Disposal of Chemical Waste" for more information.
- Small spills of dilute formalin solutions must be cleaned up immediately. Cover the spill with paper towels or other absorbent material. **Do not** mop up a spill. Using a dustpan, scoop the absorbed formalin into a plastic bag. Be sure to wear gloves and eye protection. Double bag, seal, and label the waste. Dispose as hazardous waste. Clean the spill area using 10% bleach solution with a little detergent and then rinse the area with water.

**Caution:** If spilled formalin causes eye, nose, or throat irritation, immediately evacuate the area, close all doors to contain vapors, and call the UC Fire Department at **911**. Be prepared to give the location of the spill, approximate amount involved, your name, and phone number. Have someone wait for emergency response personnel outside the building and direct them to the spill area.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or [ehsdesk@ucdavis.edu](mailto:ehsdesk@ucdavis.edu).